COAL MINING

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May, 1960

Volume 37, No. 5

rugged equipment for tough jobs...

Highway

Allis Chalmers HD-21 at Marion Center Mining Co., Marion Center.

A-1055A

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BLASTING IS OUT— D9 AND RIPPER IN— PRODUCTION UP 35%

Gillen Coal Mining, Inc., is salvaging a six-ft.-thick seam of coal near Carbondale, Pa. To get to the coal, 180 ft. of overburden must be removed—10 ft. of topsoil, 100 ft. of hardpan and, finally, 70 ft. of rock.

Gillen used to blast through. Then they changed to a Caterpillar D9 Series E Tractor with a No. 9 Ripper. Production shot up 35%. Cost savings are estimated to be *60%!*

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The D9 and No. 9 is an all-business combination of power and speed. The Series E Model D9 has a 335 HP (flywheel) turbocharged engine to put massive power into the work. You get more power from every gallon of fuel. The Series E D9 has a heavier undercarriage. Track components are bigger, heavier. You get up to 40% more life with deeper hardened steel shoes, links and rollers. A new equalizer bar makes the Series E D9 even more stable.

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COAL MINING

Vol. XXXVII May, 1960 No. 5

Contents

Do You Know ---------- 4

Here and There In The Coal Industry 4

Present Man and His Industrial Security ---------- 9

Management Controls at Mechanized Mining Operations -- 13

Safety Publicity ---------- 21

Power Shift Transmission — A Proved Production Booster --- 23

Advertiser's Index ---------- 34

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Write for Bulletin E-702S!

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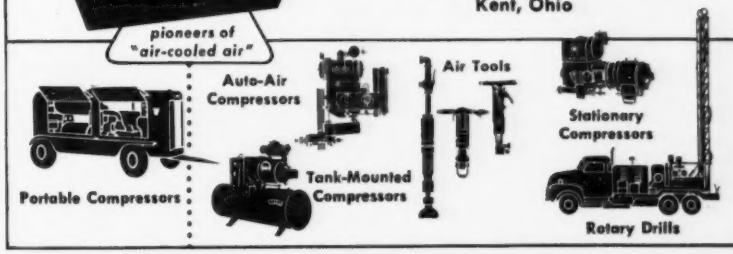

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Here's Why Beckwith Can Give You the Best Parts Service in this Area . . .

* Larger Parts Inventory
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* Superior Undercarriage Rebuilding

Beckwith's one-and-a-half-million-dollar stock of genuine Caterpillar parts insures delivery of what you want, when you want it. Downtime is cut to an absolute minimum. Yes, Beckwith-Caterpillar parts service is better than ever before . . . we are filling 83% of all parts orders over the counter and 98% are filled within 24 hours.

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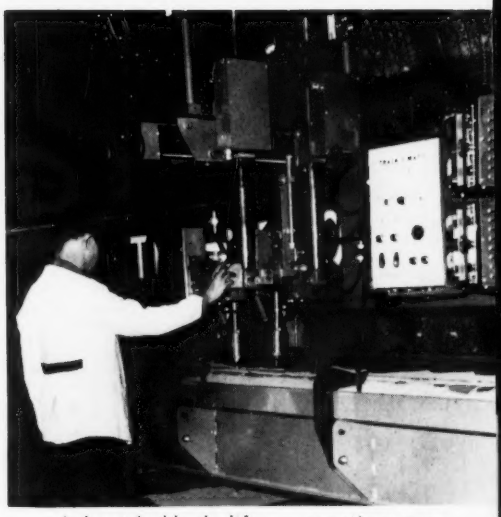
In addition to our large parts inventory of new production-line Caterpillar parts we have expanded our inventory of Beckwith-rebuilt Exchange Assemblies. Under this plan, you turn in your worn parts for *guaranteed* rebuilt assemblies at very reasonable cost. This means less downtime, lower cost and fewer headaches.

To further serve our customers, we have doubled our capacity for rebuilding track rails, rollers and idlers and are working our automatic welding specialists on a two-shift basis. In addition, we now offer free pick-up and delivery on under-carriage rebuilding in our territory.



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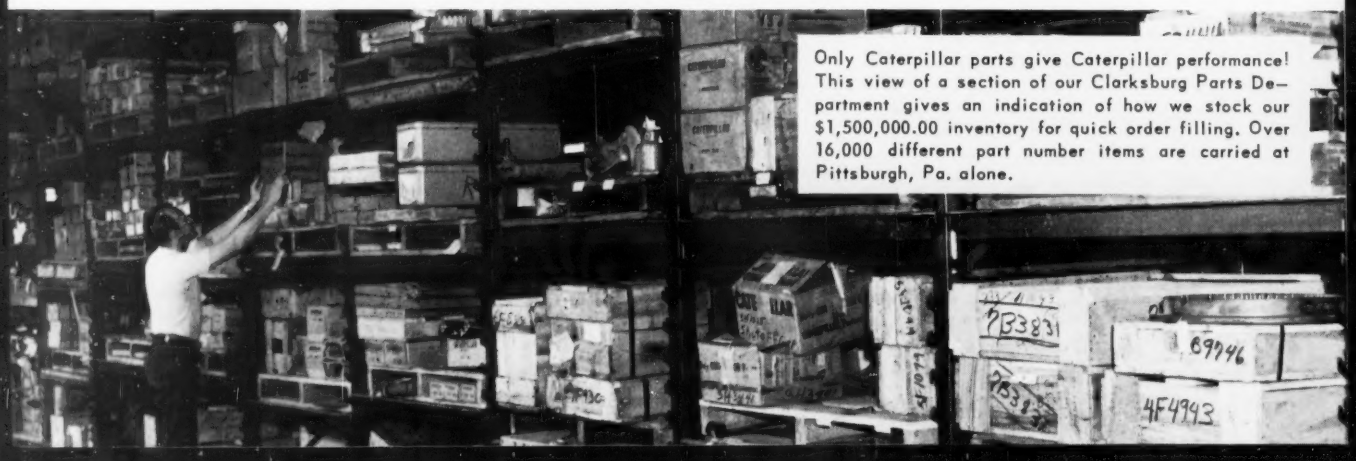

Only Caterpillar parts give Caterpillar performance! This view of a section of our Clarksburg Parts Department gives an indication of how we stock our $1,500,000.00 inventory for quick order filling. Over 16,000 different part number items are carried at Pittsburgh, Pa. alone.

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Earthmoving Equipment Is Our Business—Service, Our Concern

Do You Know?

● Engineering and science, once clearly distinct fields, are moving closer together.

Basically, science is concerned with discovery of knowledge and engineering with the application of discovered knowledge, Prof. Dale R. Corson, new Dean of the college of engineering, Cornell University, reported here.

But the distinction between the two become hazy, he said, when the period between discovery and application is short, when the engineer needs scientific information in a field not fully explored, or when the solution to an engineering problem requires the engineer to dip deeply into existing scientific or mathematical knowledge.

Sometimes, he said, the distinction cannot be drawn at all, as in the case of an electrical engineer in the field of radio astronomy. If he is not a competent engineer, he cannot design the apparatus he needs for his studies. But if he is not a competent astronomer, his work is apt to be trivial.

* * *

● America is fighting a losing battle in trying to meet today's mounting water pollution problems with outdated equipment, a Government report discloses.

It shows that the total combined national expenditure for water pollution research is now running less than six million dollars a year. Less than one-third of this is spent by the U. S. Government. The special report was filed by the Public Health Service with the Senate Select Committee on National Water Resources.

"It is obvious," said Sen. Robert S. Kerr (D.-Okla.), committee chairman, "that a country spending over $1.5 billion per year on 'soap operas' and other forms of TV and radio entertainment should invest much more than six million dollars annually to find out how to keep these fine new products of our soap factories and other chemicals from spoiling our drinking water."

In addition to scientific research, the PHS report urges:

1. Nation-wide planning of water quality control programs for river basins at a rate up to $8,000,000 a year.

2. Collection of data on sources, strength, volume and hazards of all types of pollution.

3. Construction of the $4.6 billion unbuilt backlog of remedial works needed to use the best methods now available to clean up water source in the next five years.

4. Better enforcement of state and Federal anti-pollution laws.

5. Legislation to meet new pollution problems, and action to establish wider public understanding of the pollution problem.

HERE AND THERE IN THE COAL INDUSTRY

● E. R. Phelps, Pittsburg, Kans., wsa elected president of the Pittsburg & Midway Coal Mining Co. at a meeting of the board of directors. Mr. Phelps succeeds the late Kenneth A. Spencer. The board also elected Kenneth C. Colyer as treasurer and Henry J. Hofmeister as Secretary. Dick H. Woods, Kansas City attorney, was elected to the board to fill the vacancy created by Kenneth Spencer's death.

* * *

● Bailey Moore Neel, 52, vice president of Wise Coal & Coke Co., died Feb. 26 in Norton, Va. He had been with Wise since 1957. Previously he was associated with Stonega Coke and Coal Co. in Virginia, and with Pennsylvania operators, for almost 20 years. He was the son of the late Charles B. Neel, secretary of the Virginia Coal Operators Association.

* * *

● I. J. Richardson and T. G. Osborne of Harman, Va., announce formation of a holding corporation, Raleigh Pocahontas Mining Corp., which has purchased the outstanding stock of Lillybrook Coal Co., Lillybrook's mines are the Affinity, Killarney and Lillybrook No. 3, in Raleigh County, W. Va. The company plans to reactivate Lillybrook No. 3, starting production in late March, and to rebuild the Affinity tipple and preparation plant. When the plant is complete, it will process coal from the three mines.

* * *

● Herbert E. Jones, Charleston, W. Va., member of the NCA board of directors, was named chairman of the boards of Amherst Coal Co., Amherst Fuel Co. and Amherst Barge Co. at the annual meetings of these groups Feb. 11. Mr. Jones formerly was president of these three companies. Herbert E. Jones, Jr., former executive vice-president of Amherst Coal Co., was named president, and Charles T. Jones, first vice-president. Charles T. Jones was named president of Amherst Fuel Co. and Amherst Barge Co. Herbert E. Jones, Jr., was named first vice-president of these two companies.

* * *

● Marmon-Herrington Company, Inc., Indianapolis, Indiana, announced the acquisition of the assets of The Long Company of Oak Hill, West Virginia, one of the nation's leading manufacturers of underground mining machinery.

John B. Long of Oak Hill, West Virginia will be President and Chief Executive of the new Long Airdox Division and will be a Vice President of Marmon-Herrington. He has also agreed to become a director of Marmon-Herrington.

* * *

● Dr. Myles E. Robinson of the National Coal Association has been appointed secretary of the Exporters' Association.

Dr. Robinson will succeed F. F. Estes, who retired March 1 after 15 years of service to the Exporters' Association. Dr. Robinson is director of economics and transportation of NCA, with headquarters in Washington. NCA President Stephen F. Dunn said, "The National Coal Association is happy to make the services of Dr. Robinson available to the Coal Exporters Association. His appointment as secretary is recognition of the mutual interest we have in overseas markets for coal. His affiliation with the coal export group insures maximum cooperation between NCA and the CEA."

Dr. Robinson, 57, was born in Columbus, Ohio. He received AB and AM degrees from Ohio State University and a Ph.D from Northwestern University. After 17 years as a university faculty member, he served as a transport economist with the Interstate Commerce Commission and head of research for the Air Transport Association before joining NCA in 1956.

Lima 1250 . . . Samm Coal Co., Hawthorne, Pa.

You're invited...to meet efficiency face to face

3 Highway equipment headquarters—Pittsburgh, Du Bois, Erie—have the latest and finest in mining machinery on display . . . ready for immediate delivery.

There, too, you'll find complete parts depots. And, fully manned service departments . . . ready, eager and able to handle any repair or maintenance job. Plus fleets of service trucks that operate 'round-the-clock.

You're invited! Drop in at Highway. See for yourself. Or visit any major mine. At Samm Coal Co. . . . other strip operations, you'll find many pieces of smooth-operating, efficient equipment—sold or rented, serviced and guaranteed by Highway.

A-1676A

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17,122.05 TONS

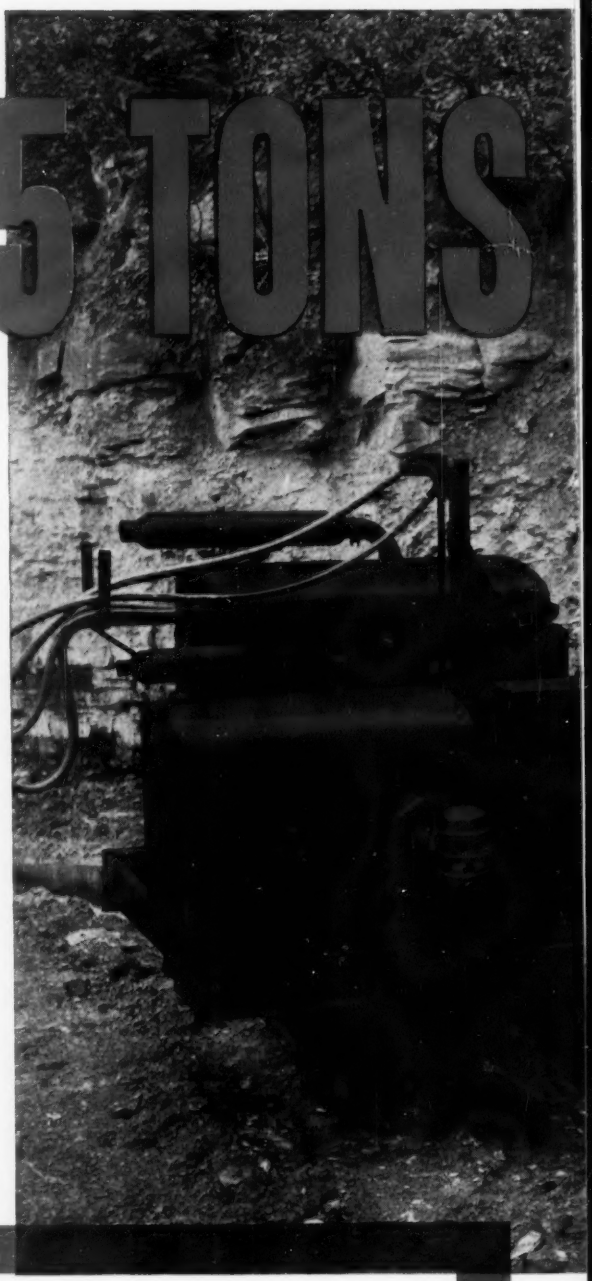
in Hazard #7 Seam

"We auger mined 17,122.05 tons of coal in October, 1959, with our McCarthy Coal Recovery Drill," says Stamper Collins. "We averaged 95 tons per man per shift as opposed to 13 tons in deep mining. We've had less than four days downtime due to mechanical troubles in more than two years."

Stamper Collins is an old, long-established user of Salem Tool equipment. He has produced as much as 64,967.90 tons of coal in five months. Like most Salem customers, Collins works his drill 'round the clock in all kinds of weather. He stops only for once-a-week servicing and maintenance.

These heavy, rugged, powerful units move from hole to hole under their own power on hydraulic skids. No extra 'dozer required. And they work close to the face—even on an inside curve of the highwall. Salem-built McCarthy recovery drills load from either side. You need only a two-man drill crew.

If BIG TONNAGE at low cost is important to you, get the facts on Salem's McCarthys today. Initial investment is less; pit-to-pit moves faster; set-up quick. Add it up . . . augered coal costs less with a McCarthy!



TWO-MAN OPERATING CREW adds new auger quickly. This Model 1500-30-36-42 has faster carriage travel and greatly increased horsepower. Built-in conveyor speeds loading.

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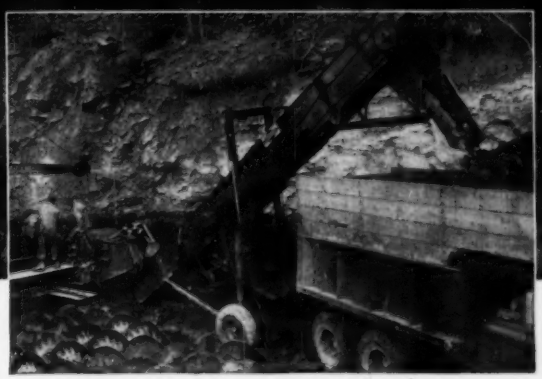
Parkersburg, W. Va. Columbus, Ohio Youngstown 7, Ohio

IN ONE MONTH



ABOVE—DRILL OPERATES at top speed even on this narrow, wet bench. Self-moving, heavy-duty hydraulic skids float drill over soggy earth. Individually operated jacks quickly set drill for best angle.

TOP RIGHT—LUMP SIZE can be controlled with Salem cutting heads. Salem operators have ready markets for their high quality coal.

RIGHT—EVENLY SPACED HOLES show ease and accuracy of auger placement. Drill can move just a fraction of an inch if desired! You mine maximum amount of coal.

Allis-Chalmers HD-21 . . . Shawville Coal Co., Shawville, Pa.

Operators call it...(and so will you!) "Coal Mining's finest tractor!"

Successful mines everywhere . . . many of them served by Highway . . . are now standardizing on Allis-Chalmers HD-21s.

Call your Highway representative today. Ask for a list of satisfied customers. Any will be happy to tell you how Allis-Chalmers is boosting coal production while cutting costs.

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Present Man And His Industrial Security

• On his path of evolution, man is unique as no other animal has ever been. Combining ever greater skill at abstraction and communication with ever-increasing utilization of energy sources, man's main pattern of constantly changing environment led him through successive steps of tool invention and tool improvement up to his present industrial revolution and to his society and culture.

Society and culture, which are wholly products of invention and developments of tools, permit man to make and to control his environment. Changes in man's adaptation to his environment have depended primarily on industry. Man's novel method of adaptation to his changing environment have been through his society and culture, which depend to a very great extent on elements and new ideas from industrialization.

If it is man's hope to perpetuate his evolutionary advance, a great deal of his progress, to a great extent, will depend on his industrial progress. The one thing man must learn, today, is that there cannot be industrial progress, or security, unless there is industrial efficiency. There cannot be ever-higher wage for the worker in this free world unless the higher wage is earned, by the worker. There cannot be any kind of progress unless there is production of a product that can be sold in a competitive, and that is coming to mean, generally, in the international market.

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Capacity 290 Cubic Feet
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4 — 18" Cast Steel Wheels — Timken Bearings
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Complete Specifications Available Upon Request

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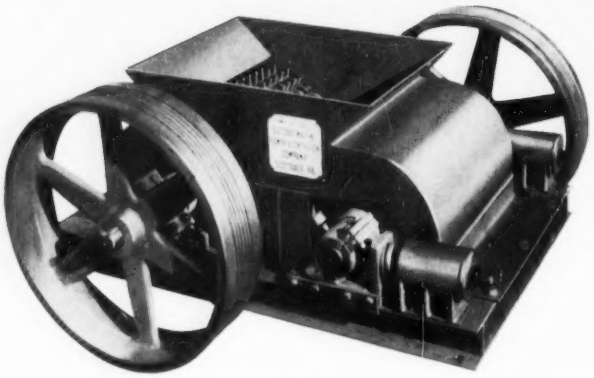

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The powerful chilled cast iron double rolls of the 63 special are covered with hundreds of steel teeth which speedily bite, chew and shred the coal to any wanted size from ¾" to 8" . . . fines are held to a low minimum.

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C. M. DONAHUE
President, M. S. A. International Division
Mine Safety Appliance Company

● C. M. Donahue, vice president of Mine Safety Appliances Company, has been elected to a new post in the international operations of the company.

Mr. Donahue becomes president of the M.S.A. International Division, and continues as vice president of of the parent company.

All international subsidiaries, and the Export and Mining Departments of the parent company, are under Mr. Donahue's supervision. Subsidiary companies have headquarters in Johannesburg, South Africa; Glasgow, Scotland; West Berlin, Germany; Milan, Italy; Caracas, Venezuela; Mexico City, Mexico; and Toronto, Canada.

Mr. Donahue joined Mine Safety Appliances Company in 1927. He is an engineering graduate of Pennsylvania State University. In 1946, he was named manager of the firm's Mining Department, and became, in addition, manager of the International Division four years later. He was elected a vice president in 1953. He is a past president of the Coal Mining Institute of America and of the Mine Rescue Veterans of the Pittsburgh District. He is also a member of the National Mine Rescue Association; American Institute of Mining and Metallurgical Engineers; Mine Inspectors' Institute of America; Veterans of Safety; Engineers Society of Western Pennsylvania, of which he is presently a director; and of several regional and state coal mining institutes.

Here, the THRU-STEEL Dust Collector is mounted on a continuous miner. Roof bolt drills and dust collectors on both sides of the machine help keep roof bolting up to or ahead of the miner.

For maximum efficiency

New M-S-A® Collector sucks dust through drill steel —speeds roof bolting, improves safety

The M-S-A® THRU-STEEL* Dust Collector helps keep roof bolting up to or ahead of the mining cycle.

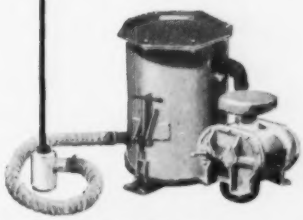
With old style collectors, time wasting set-ups are necessary to raise the dust collecting head against the roof. Not so with THRU-STEEL Collector. Collector cup and jack assembly are eliminated. Dust is sucked into the tubular drill steel through narrow slots below the bit, and quickly conveyed through the drill steel to the collecting tank. Smooth round drill steel, used with this system, is easier to handle than scrolled augers. Steels can be added and withdrawn easier, faster, and more efficiently.

THRU-STEEL Collector assures safe, proper dust control because bolt hole drilling and dust collecting operations are integrated. Cleaner, safer working conditions, with better visibility result. Drill steels are safer to handle. No scrolls to snag gloves, sleeves, or clothing.

The M-S-A® THRU-STEEL Dust Collector installs on any roof bolting machine or continuous miner equipped with roof drills. Various lengths of drill steel make it adaptable for high or low seams. If you have the M-S-A® Bolt-Hole Cleaner, it can be converted to a THRU-STEEL Collector easily, inexpensively. Call your MSA Representative for all the facts, or write us for bulletin.

*Trademark

This is the THRU-STEEL system. It consists of the bit, drill steel, chuck adaptor, rectangular or cylindrical collecting tank, vacuum pump, relief valve, and silencer.
USBM Approved



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"Our Payloaders reduce costs for loading, pick up, and transport. They're very flexible and easy to handle," says Bob Scutta.

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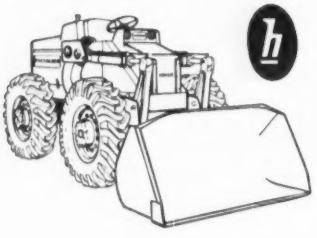

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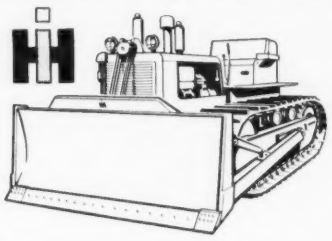
TOP VALUES IN NEW AND USED EQUIPMENT



Management Controls at Mechanized Mining Operations

Time studies are a major factor in Modern Management controls, and are applicable at Mechanized coal mines, at Continuous mining operations, and even at the coming Automation mining operations.

By: P. R. PAULICK, P. E.
Consulting Mining Engineer
Bethel Park, Pa.

● Today we are living in what may be called the FOSSIL FUEL AGE, because today coal, gas, and oil supply about 92% of the worlds total energy requirements, with water power accounting for about 1%, while the balance 7% is furnished by men and domestic animals. Atomic energy as yet accounts for only a very small fraction.

Just a short one hundred years ago, the exact opposite was true. Then human labor and animal energy accounted for about 92% of total energy, while fossil fuels and water power accounted for the balance of 8%.

It is interesting to know that while fossil fuels were known to man for more than 3000 years—the Chinese used coal for heating and cooking 1000 years B. C. — more than five-sixths of all fossil fuel consumed have been burned during the last 60 years. As a matter of interesting fact, all the fossil fuels burned prior to 1900 would not last 5 years at current consumption rates.

The U. S. A. today with only 6% of the worlds population, consumes about 34% of the worlds total energy. This high energy consumption produces our present high standard of living mostly because our working labor force performs with high capacity machines rather than with its own muscle power.

For example, it has been determined that the average man's muscle power is rated at about 35 watts continuously, or roughly .05 horsepower. So that in a modern coal mining operation, a mobile loader operator has the equivalent of about 1000 men to help him load coal, and a "continuous miner" operator has more than 3000 men equivalent to help him load coal.

Today coal accounts for about 30% of all energy requirements in the continental U. S. A., but approximately 70% of the electrical energy requirements. It is with this phase of Fossil Fuels—coal—that we are concerned in this paper, the efficient production of coal.

Many papers and articles have been written and published on this subject. Our concern here is the basic function of Modern Management controls at mechanized mining operations, together with the resultant performance attained. The spectacular productivity attained by the American coal miner has been the product of a combination of modern management together with modern mechanization machines and mining systems.

Beginning with year 1900 when the average overall productivity of the American miner was 2.98 tons per man-day, to 1959 when his productivity rose to 11.90 tons per man-day, a rise of 400% in 60 years. A feat accomplished by very few other industries.

In the following paragraphs, the use of time studies as a major tool of modern coal mine management function will be developed:

Just after the turn of the 19th century, Frederick Winslow Taylor, who is generally conceded to be the father of time studies, inaugurated a program of extensive experiments and investigations into the cutting speed of various tools and machines, the manual handling of pig iron, etc. The results obtained by these experiments were so astounding—as much as 60-100% increase in output was obtained over the old methods —that a veritable storm of contro-

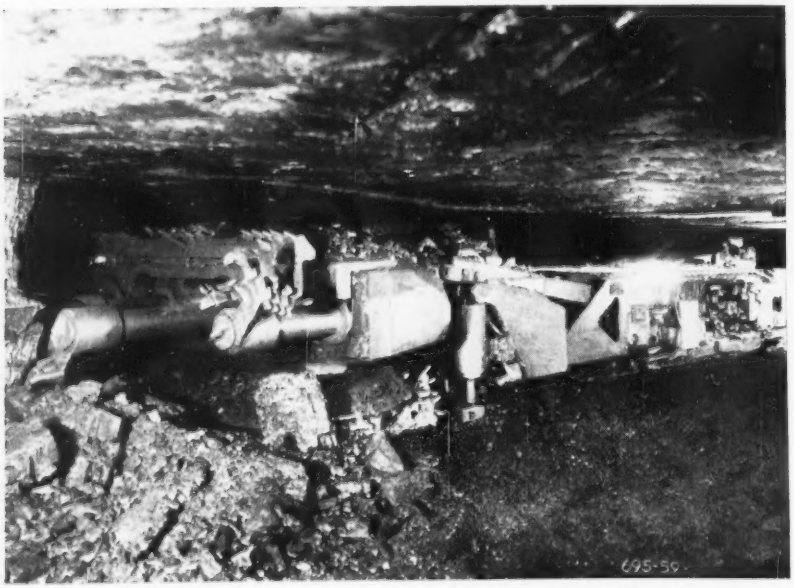
Shows one of the first typical mechanical loaders, loading directly into mine cars. Period 1923-1936, using 10-15 places, and 10-17 man crews, producing 150-300 tons per shift, or 15-20 tons per man-day.

versy was released. Taylor, in his experiments showed what should have been an evident fact that the workman was not in a position to experiment and find out the one best way of doing a job. For a workman's skill at best consists of little more than the accumulated knowledge of his predecessors. He has no knowledge nor means of determining the value of new methods, new tools, or machines. Many industrial leaders could not visualize how anyone, apparently unfamiliar with the existing working conditions, could, with a stop watch, correct the inefficiencies and inconsistancies under which the men worked, when the foreman with his years of experience could not make the corrections. However, some of the more enterprising leaders believed that Taylor had uncovered something worthwhile and tried the system in their own plants. The discussions and controversies for and against the new system raged throughout the industry and from this was born the present mass production system.

The basis of the mass production system is the breaking down of a given job into its component elements and studying each elemental operation by means of time and motion studies, from which the one best way of doing the job is determined. This plan of studies is carried through a series of jobs and a continuous operation is developed and devised. The value of this subdivision and specialization of labor, and methods has been the primary reason for the leadership of the American mass production system, the outstanding examples being the automobile, electrical and other huge manufacturing industries.

Industrial business operations of today are exemplified by our corporate system consisting of three component parts: Capital, Labor, and Management. Management being the guiding medium. It is the responsibility of managers to coordinate and harmonize the activities of the different departments of the enterprise so that it may function as an efficient whole. Analogously, a manager is like the captain of a ship at sea; he not only has the ship and crew to look after, but he must also safeguard both from the perils of the surrounding sea. Furthermore, the manager of any enterprise must satisfy three separate groups if the operations are to continue harmoniously and continuously: — Stockholders, Employees, and Customers.

First, stockholders want a fair return on their invested money, and soon become dissatisfied with managers who do not produce such return.



Jeffrey High Production Colmol for low seam operation.

Second, the employee wants a fair and living wage to satisfy his personal and family wants. Temporarily he will work for less, but sooner or later he rebels.

Third, the customer must be satisfied both as to the quality and price of the product. If either the quality or price is not right he eventually finds a substitute.

So that the above three requirements could be fulfilled, idustrial leaders inaugurated the so-called modern management system which is fundamentally based upon time studies. After the industrial revolution, industries steadily grew in size and complexity so that the destiny of an enterprise could no longer be governed by one individual and the management control system changed from a one man personal basis to a group statistical basis. Thus production forecasts, sales forecasts, budgetary control, etc. are now based upon facts and figures rather than one man intuition, or the personal experience of a manager.

It has been definitely proved that one of the most effective ways to obtain profitable results is to estab a definite goal for attainment. And for the purpose of determining this goal there is no better method than time studies by which definite accurate standard production capacities of men and machines are established. Time studies are also used to analyze and correct faulty and inefficient operating practices, determine and establish the one best way of doing a job, eliminate delays, etc. The standard production capacities setup from time studies are then used to compare actual results obtained either daily, weekly, or monthly and efficiency rating given each unit. High production per man or per machine and low unit cost is dependent upon the intelligent use of a definite task as a measure of a day's work and not upon the time spent on the job by a workman or machine.

High unit cost (per ton) can be traced to the following three principal sources, all three of which are

(Continued on Page 19)

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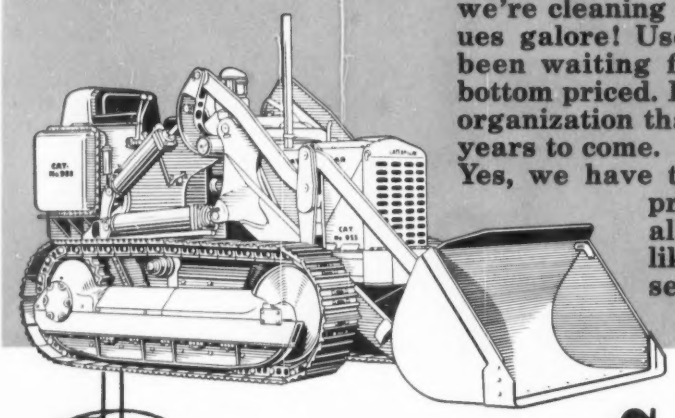

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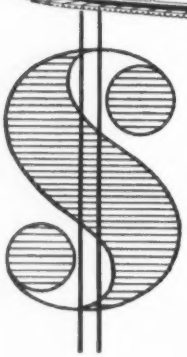

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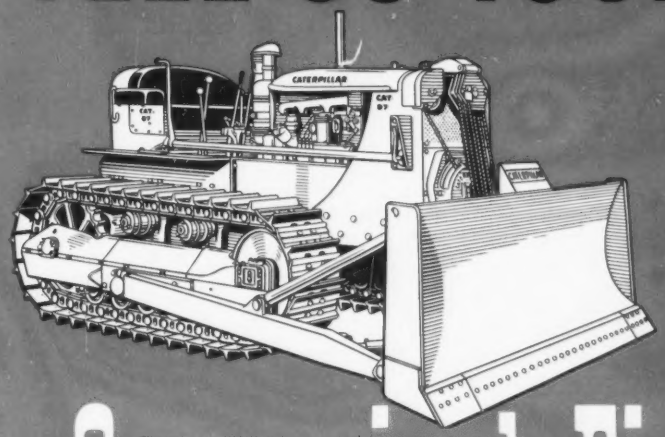

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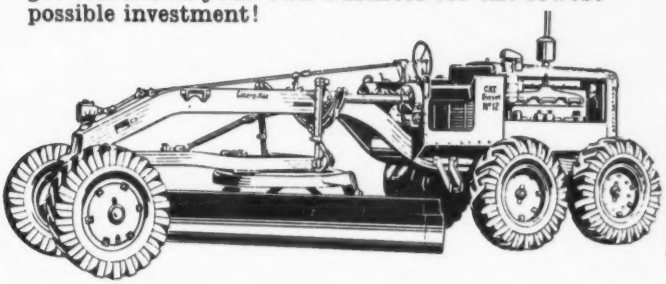

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MANAGEMENT CONTROLS

(Continued from Page 14)

susceptible to time study analysis and correction:

First, losses due to failure to use mine area effectively, absence of mine concentration, and failure to use equipment and labor to its full capacity.

Second, losses due to unnecessary delays, waits, interruptions, insufficient labor, tools, supplies, etc., lack of proper equipment and poorly planned mining system.

Third, losses due to carrying excessive and unbalanced supply of inventories such as repair parts, timbers, ties, rails, conveying equipment parts, etc.

At any given mining operation, we can setup complete production standards from detailed time studies for all types of work; continuous miners, track or trackless loading machines working in rooms or entries, drills, locomotives, trackmen, timbermen, roof bolters, etc. But before making an analysis of a detailed time study, I believe it would be interesting to enumerate some of the chief characteristics of a good time study engineer. Like all men holding responsible positions, the time study engineer must be a man of high caliber, one who can carry out the true aims and principles of time studies and get the desired results with least amount of friction. In a mining operation where time study principles have been practiced for some time this is comparatively an easy matter, but in a mine where time studies are new to both men and management the best qualities of the engineer must be brought into play if antagonism is to be avoided and satisfactory results obtained. Every good time study engineer should possess the following characteristics:

1. Personality and Tact. True a good personality is an asset in any line of work, but it is especially so in time study work. A time study engineer must get along with people in a positive way. He must be able to establish new methods and plans without friction to designers of the old. Naturally a great amount of tact is neccessary if dividends are to be earned by time study work.

2. Patience. Patience is the greatest of all virtues, and the time study engineer must have an abundant supply. There will be times when the fruition of his plans and methods will be delayed again and again. Trying delays will attest this virtue to the utmost. He must remain calm in the face of excited and angry men and be able to convince them of the true value of the proposed method. He must take calmly the lack of cooperation and stand just and unjust criticism.

3. Judgement and Self-Confidence. Clear, honest judgement is needed in determining the intrinsic worth of new ideas developed, in process of development, or under investigation. He must be broad minded and be open to conviction on all subjects and be able to analyze from all angles, thus basing his conclusions on developed facts rather than outside desires. He must be able to judge men, especially during a time study observation and know if an honest effort is being given. Furthermore he must have complete confidence in himself and his work because it is natural that new ideas meet with opposition, and unless he does have confidence and optimism he will get gloomy predictions and be discouraged.

4. Education and Experience. Obviously this pre-requisite is essential in all lines of responsible work, but especially so in a time study engineer. In addition to academic training, he should have good practical knowledge and experience in all phases of mining work so as to balance his judgement and perspective and thus properly correlate theory and practice. Above all, he must be well grounded in English and possess good writing ability since all his work and findings are presented in written form which must be made clearly to be convincing.

5. Mental Trait. Since time study work is primarily analytical, a good time study engineer should at all times be inquisitive, he must always be analyzing, dissecting and assembling elements to form new methods. He must be alert and on the lookout for new ideas and improvements and ways for doing a job better and quicker. In other words he must like to work and solve problems.

Shows one of the latest typical "continuous miner" boring type loaders. Period 1948-1959, working in single place, with 5-6 man crews, producing 500-600 tons, or 100 tons per faceman day.

6. Accuracy. A good time study engineer must judge, think, and observe accurately. His time studies and observations must be made accurately, and the computations of these studies must be accurate if correct standard time values are to be established.

7. Initiative and Optimism. Because primarily he directs his own efforts, the time study engineer must have initiative. He has no one to go to for definite instructions but must work out his own problem. He must be able to see possibilities in a job long before anyone else and be able conclude the analysis to a finish, and to make recommendations for corrections, or installation of a new method. He must be a born optimist because he runs into so many pessimists and doubters his spirit would soon be dampened.

The equipment needed in time study work is simple. A good stop watch, time study forms, an observation board, pencils, and a slide rule is all that is needed. In making the actual observation the engineer has the choice of two methods of reading the watch: The continuous method wherein the watch is started at the beginning of an operation and all elements are timed, including delays and waits, etc. Second is the snap-back method wherein the observer times only the working elements and at the termination of each, the hands are snapped back to zero.

Making an actual time study of a given job does not mean merely the recording of the elapsed time during the performance of that job. In the fullest sense of the word, time study means the breaking down of a job into its elemental operations and subjecting each elemental operation to close time scrutiny and analysis in order that all unnecessary movements are eliminated; that all delays and waits are eliminated; that all motions, methods and conditions are standardized so that finally the operation as a whole can be standardized and a standard time limit set for the complete operation. Actual time study procedure consists of three separate operations:

1. First we have the preliminary survey or analysis. At this time the time study engineer, without watch or other equipment, analysis the job to familiarize himself with the general situation, and to eliminate large and obvious faults—using the scoop shovel as it were.

2. The second step in the time study procedure is the actual observation period. Here the time study engineer breaks down the job into its elemental operations and subjects each operation to stopwatch analysis, recording the elapsed time of each element on the time study form. Any delays, waits or other interruptions are also recorded on this form. In addition, all operation data and existing natural conditions, including a sketch of the work, is made at this time.

3. The third and final step is made at the office where the time study data is summarized and standard capacity computations are made. After the study is summarized, the productive time separated from non-productive, the productive time is broken up into its elemental component parts which are then called the "unit standard times." With these unit standard times available, setting up a standard time allowance on a job is just a matter of arithmetic. The unit standard times are added together and we have the total time allowance for that job. To this total time is then added a flat percentage allowance for personal needs and unavoidable delays, and we have the finished product — total allowance standard time for that particular job.

The same procedure is used to determine the standard capacities of all the other mining equipment: Cutting machines, drills, roof bolters, hoists, locomotives, etc. Now with a specific measuring tool for all production and service units we are ready to apply these control yardsticks for the purpose of cost control and increased productivity with consequent decreased unit cost.

There are various ways of using this cost control yardstick differing only in the degree of application. Obviously, the fundamental desire of every manager is to attain maximum production at minimum cost. One of the ways in which we can use the yardstick is a system of production charts. These charts are used to determine the performance of each individual loading machine, type or group of machines, and the mine as a whole. Ordinary cross section paper is used; the horizontal lines repre-

(Continued on Page 22)

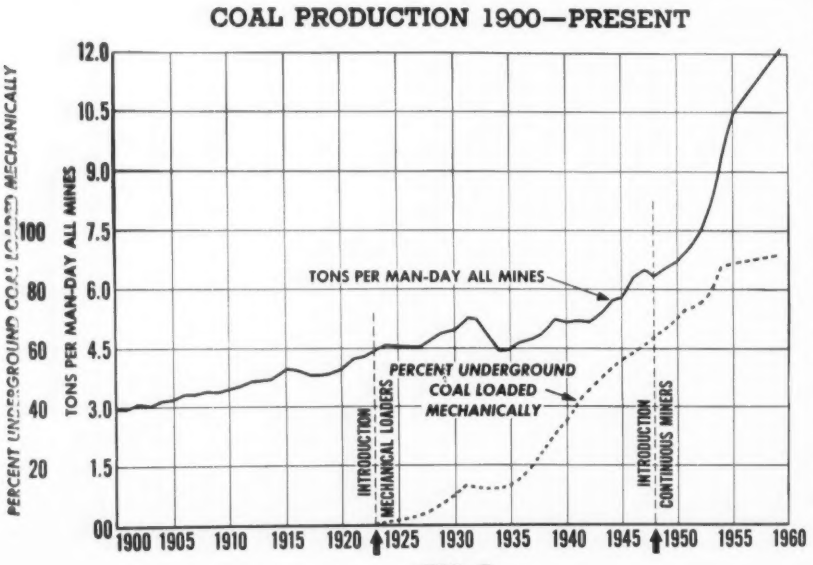


FIG. 8

Chart showing progressive increase in overall miner productivity in U. S. A. coal mine. Period 1900 to 1959.

Safety Publicity...
Key To A Lower Accident Rate

Publicity keeps hammering away at ideas management wants to get over to some public . . . safety is a natural subject for good publicity for your coal mine.

by PAUL LOCKWOOD

• Coal mine management knows that there is one BEST way to reduce the accident rate . . . make everyone safety-conscious. When people are thinking safety, they are more apt to be performing their duties around the coal mine in the safest possible way.

One technique of creating safety-mindedness is to develop a planned program of safety publicity. This plan keeps reminding everyone of safety everyday. To be most successful, the program needs to have variety, have human interest, and be on a continuing basis.

Here are ten ideas you can use in your safety publicity program to make it different, interesting and continuing:

Safety Advertising

Many Coal mines have signs that announce to the workers and the general public the number of days worked without a lost-time accident. These signs may be at the gate so everyone can read the record of the mine in safety. This serves as a reminder just before the employees come to work, and makes it a topic of conversation for the employees when talking to friends who have seen the sign.

Another adoption of this idea is to run a small space advertisement in the daily paper. This could be a small one-column one- or two-inch advertisement. It would be set off with a bold border and would report the number of days or production without lost-time accident. The name of the coal mine and a word about the figure would complete the copy for the safety advertisement.

Daily changes are necessary to keep this advertisement up-to-date in the local newspaper. However, an arrangement can be made with the paper that one day is added to the last mentioned total each day unless a report comes in indicating otherwise.

This program makes everyone conscious of the record of the coal mine. The cost of the program is small and the effect on the safety-mindedness of the employees is great. A feeling of pride develops and everyone wants to keep the record clear and improve it for their friends and neighbors to see in the daily paper.

Safety Contests

The competitive spirit is strong in everyone. We all like to read about the results of a contest of any nature. We follow the major league baseball standings . . . we read detailed reports of fights . . . check bowling scores. We like to know about competition in anything.

When any type of safety contest is held, there is a natural publicity appeal. Readers of the local newspaper will be interested in the standings in a safety contest . . . in knowing the winners . . . and in knowing some of the ground rules that apply to the contest. All of these ideas can be used for publicity to make your employees more safety-conscious.

For instance, you can develop publicity about how the safety contest is to be conducted. This can be followed up with the standings of the teams or individuals involved. Weekly reports of the standings will give extra interest to your publicity program. Finally, when the contest is over the winners can be announced. Thus, you will have at least three and perhaps more publicity stories printed about your safety contest.

Home Safety

Features about home safety are welcomed by newspapers. This can be featured as an interview with the executive in charge of the safety program in the coal mine. Or, it can be written by the safety executive with the coal mine affiliation to give it added weight.

Families of the employees in your coal mine will read the safety article for two reasons. First, because they are interested in the viewpoints of the employer, and second, because they are interested in following safe procedures in the home.

Vacation Safety

This is similar to the home safety publicity idea. It is timely and can

include many things that would avoid any accidents during a vacation period. This, too, will have general interest because it hits a common problem of the employees and their families.

Ideas of this nature can be developed into safety while camping, safety in boats, safety in climbing, safety in swimming, etc. In addition to bringing your employees back to work safely from their vacations, you let the general public know that you have a safer place to work — an organization that stresses safety everywhere.

Safety Equipment

Publicity is news . . . and one of the standard news items for your coal mine is new safety equipment you purchase for the protection of your employees. For instance, when you issue a new type of goggle for your employees, you can use this for a good human interest news story in your local newspaper.

Details of the story will cover the reasons for the new safety goggles . . . the improvement anticipated in reducing the eye-accident rate. Again,this will be of interest to the general public as well as the employees.

New major equipment you purchase for your coal mine can be used for this type of safety publicity. You pin-point the safety attachments or features of the new equipment. These are featured in your publicity to keep safety-mindedness at a high pitch with all publics.

Automobile Safety

You know that at every major holiday, the newspapers feature the auto accident rate locally and on a nation-wide basis. This is a natural bit of safety publicity for your coal mine when you tie-in with some hints of safe driving via your safety director . . . this tends to localize the safe driving advice given in the papers.

Safety Personnel

Every time you appoint someone new to your safety supervisory position or change the makeup of your safety committee, there is an opportunity for safety publicity for your coal mine. The past record of the new safety supervisor can be used to emphasize the interest you show in safety.

When your safety director attends any national meeting in the interests of your coal mine, his story can be included in your safety publicity. This will give your employees and the general public a better picture of the safe working conditions you try to maintain in your coal mine and how you stand on a national basis.

Safety Meetings

Every time your safety Committee meets there is an opportunity for favorable publicity about your safety program. You will get this type of publicity by featuring as many names as possible in these safety publicity releases. The ideas or recommendations covered at these meetings can be used for other news stories in your local newspaper.

Safety Records

Every time a major mark is passed in safety at your coal mine, you can use this as the basis for a publicity story on your safety program. For instance when your coal mine has gone 1000 days without a lost-time accident . . . or 111 days . . . or any mark that has news value it can be used for this.

Or, you can feature the safety records of individuals in your coal mine. Whenever any award is made for safety in the coal mine, a local news story for your local newspaper can be used to give this program more emphasis and to give the employee more recognition for his safety activities.

Safety Suggestions

When one of the employees submits a suggestion that has safety as the main purpose, this can be featured in your publicity. This gives your coal mine a double-barreled program of stressing how cooperative it is and how safe it is in so far as working conditions are concerned.

Anything you do to keep the idea of safety before all of your publics will prove well worth while in lower accident rates, improved morale, and the good will of the general public about how much interest you show in safety around your coal mine.

MANAGEMENT CONTROLS

(Continued from Page 20)

senting time, and the vertical lines the tonnage. The daily production of each unit is charted in "bar" form, keeping the day and night shifts separate by means of colors. In addition to tonnage, the name of the supervisor, location, section, and also the standard capacity of the unit as determined by time studies. At the end of each month, the average tonnage is computed and shown for each unit and also the efficiency attained.

Here then we have a complete production control tool by which the superintendent, or any one else interested, can tell at a glance just what each loading unit is doing in terms of tonnage and efficiency. The monthly efficiency is shown in figures on the chart, while the daily efficiency is based upon how close the vertical bars approach the horizontal line representing the computed standard tonnage. Low production units are spotted at a glance and necessary corrections made, no long tedious shuffling of papers and listing of long columns of figures are necessary for analysis by the manager.

During the past 60 years the overall productivity of the American coal miner increased by more than 400%, the greatest rise being at an accelerated rate since the inaugeration of "continuous miners" in 1948. In that short period the coal miner productivity rose from 6.26 tons per man-day, to 11.90 tons per man-day in 1959.

Because of this accelerated worker productivity the coal industry has been able to maintain stable prices—(about $5.00 per ton FOB) in spite of the many substantial wage increases during that period.

This record speaks well for the competative position of the coal industry in its inter-fuel struggle, and reflects the ability of management to control production costs, together with the innovation in mining methods, plant modernization and mechanization made possible by the cooperation of the mining machinery manufacturers.

Power Shift Transmission--A Proved Production Booster

By T. J. ZARSE, Market Division
Caterpillar Tractor Co.

● If you're looking for a way to boost production on any one of several bulldozer applications, here's some information in which you'll undoubtedly be interested.

Figures obtained in an accurately controlled test indicate that the recently-introduced power shift transmission offers a dozing production advantage of up to 27 per cent over that possible with direct drive tractors equipped with a constant mesh transmission.

Laboratory and field tests conducted during development stages of the new transmission had indicated that tractors equipped with it could move considerably more dirt per work unit.

Seeking an answer to the question of how great an increase could be expected, a study was conducted at Caterpillar's sales demonstration area near Peoria. Two new 235-horsepower tractors, one equipped with direct drive and the other with a power shift transmission, were used.

Dozing distances of 50, 100 and 150 feet were staked off in pairs. In each instance, the pits were side by side to insure that soil conditions would be as nearly the same as possible. As a further control, the same operator was used on both machines to eliminate the possibility of operator differences.

Each tractor was run through 17 complete cycles with time information recorded for all phases of each cycle. This number of passes was chosen because it produced the largest hole practical in a 50-foot pit. Volume of each of the six pits was determined by cross-sectioning.

Working gears used by the tractor in all phases of the test were: Direct drive—cut and doze, second; reverse, sixth: Power shift—cut, low; doze, second; reverse, third.

Following are the production and cost figures obtained in the test: (All times in minutes)

Doze Distance (Feet)	50		100		150	
235 HP Tractor	Direct Drive	Power Shift	Direct Drive	Power Shift	Direct Drive	Power Shift
Cut	.33	.35	.40	.37	.35	.35
Doze	.37	.31	.64	.45	.92	.66
Shift (F to R)	.04	.01	.04	.01	.07	.01
Reverse	.24	.27	.33	.32	.39	.42
Shift (R to F)	.09	.01	.08	.02	.11	.02
Total Cycle Time (Avg.)	1.07	.95	1.49	1.17	1.84	1.86
Cycle Time (17 Passes)	18.20	15.80	25.43	20.43	30.79	25.25
Material Moved (bcy)	81.9	84.5	72.0	68.7	74.25	77.6
(60 min. Hr.)	270	319	170	202	145	185
Production (Assuming 100% efficiency for both men and machines)						
Production Increase— Power Shift over Direct Drive	----	18.1%	----	18.8%	----	27.6%

Figures used in obtaining hourly owning and operating costs were:

	Direct Drive	Power Shift
Total Cost *	$40,100	$43,125
Depreciation Period (5 Years)	10,000 Hours	10,000 Hours

*Includes FOB factory cost of tractor, straight bulldozer, cable control, hydraulic tilt cylinder and hydraulic control.

	Direct Drive	Power Shift
Depreciation per hour	$4.01	$4.31
Interest, Insurance, Taxes	1.20	1.29
Fuel, Lubrication, Grease	1.33	1.33
Repairs (90% of depreciation)	3.61	3.87
Operators Wages	3.00	3.00
TOTAL	$13.15	$13.80

An examination of the production table will show that in the 17 passes each machine moved approximately the same amount of dirt, with a slight advantage going to the power shift machine. The power shift tractor moved an average of 4.52 yards per trip and the direct drive tractor an average of 4.49 yards. Thus it can be seen that the power shift feature is not detrimental to digging ability. Rather, it enables the power shift machine to move the same amount, or more, in less time.

Further study of the production figures shows that as the dozing distance increases, the power shift machine gains an increasing advantage over the direct drive machine.

The table of cycle times shows that the power shift saved time by practically eliminating shifting time and by reducing the doze time. The ease of shifting allowed the operator to upshift when the blade was full and carry the material to the fill in a higher gear. In order to do this on the direct drive machine, it would have been necessary to stop, shift, and start again. This would have lost more time than if the whole distance had been dozed in the cutting gear.

The power shift machine also shifts faster than the direct drive machine. Even when the direct drive machine was handled by an expert (the operator in this instance was a factory demonstrator) the power shift saved an average of .04 minutes (2.4 seconds) shifting from 2nd forward to 6th reverse, and .07 minutes minutes (4.2 seconds) going from 6th reverse to 2nd forward.

Considering that the shift cycle could be repeated as often as 400 times in a 10-hour day, it is easy to see that at the end of the day the operator of a power shift machine will be considerably less fatigued than the man on a direct drive trac-

tor. The fatigue factor is usually expressed in terms of operator efficiency. For this reason it is customary to estimate the efficiency of a direct drive machine at 50 minutes per hour. Taking into account the considerably smaller amount of effort required with the power shift transmission, there is reason to believe that in the future the efficiency of machines equipped with this transmission option will be estimated at 55 minutes per hour. If these figures are used, the production advantage of the power shift over the direct drive would be:

Doze Distance (Feet)	50		100		150	
235 Horsepower Tractor	Direct Drive	Power Shift	Direct Drive	Power Shift	Direct Drive	Power Shift
Production Per 55 min. hour (bcy)	—	292	—	185	—	170
50 min. hour (bcy)	225	—	142	—	121	—
Production Increase Power Shift over Direct Drive		29.8%		30.3%		40.5%
Cost Per Yard (Cents)	5.85	4.73	9.26	7.46	10.87	8.12
Cost Advantage Power Shift over Direct Drive		19.2%		19.4%		25.3%

● A brand-new coal belt construction whose solid edges will not fray or fan out even under toughest abrasion is now offered by Manhattan Rubber Division, Raybestos-Manhattan, Inc.

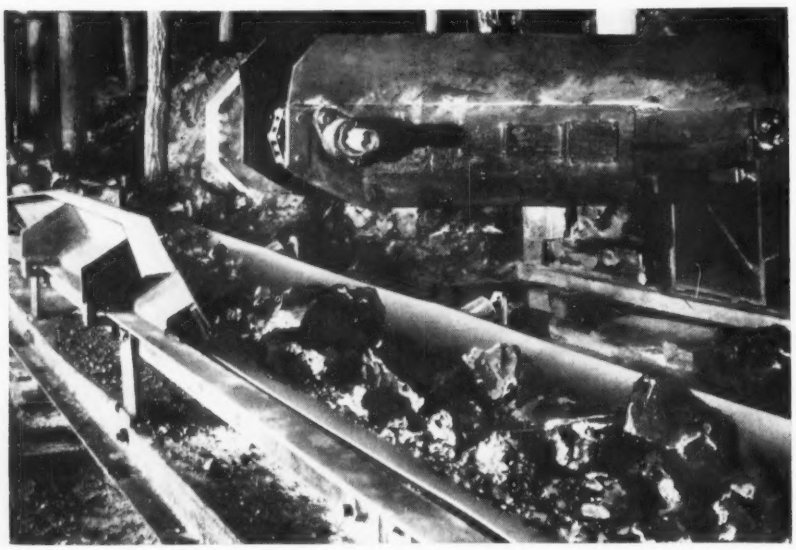
Called "Coalmover", the quiet running new conveyor belt is said to last longer and provide a higher coefficient of friction than plastic covered belts.

The exceptional pulley grip of "Coalmover" permits operation at lower tension without slip, while low stretch characteristics insure a minimum of take up adjustments.

Other advantages claimed for this new construction are superior holding ability with all underground types of fasteners, fire resistant throughout, maximum rip and impact resistance, exceptional flexibility and easy, natural training at all temperatures.

Like all Manhattan Underground Conveyor Belts, R/M Coalmover is mildew-proof, moisture resistant—and certified with a Fire-Resistant Bureau of Mines acceptance designation.

For more information write: Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J.



New fire-proof R/M "Coalmover" conveyor belt provides exceptional resistance to abrasion.

● A new "work-styled" D6 Series B Tractor that incorporates major improvements resulting in much greater machine and operator efficiency is now available, according to an announcement by Caterpillar Tractor Co.

Among the major new features are: A completely new, compact engine that gives the tractor 25 per cent greater lugging ability; two new hydraulic control units that are now integrally mounted; a tilt cylinder for special applications; an optional transmission for jobs calling for higher drawbar pounds pull and an all new operator's compartment that is more efficient and comfortable.

Resulting from the latest metallurgical advances, the new engine delivers 93 flywheel horsepower at 1,600 rpm. Extensive research and field testing of the modern design engine shows it to have greater economy and easier servicing in addition to its increased work potential.

The hydraulic control pump and tank are located at the rear of the engine, under the engine hood. This arrangement clears the radiator face and permits greater air flow, which in turn increases the radiator cooling ability. The two new hydraulic controls are the No. 165 and the No. 143.

Both new units deliver constant hydraulic power because the pump is driven off the timing gear train. Also, both units have full-flow hydraulic fluid filtration. A check valve in the pressure line holds the dozer blade in position when the control valve is moved from "hold" position to "raise".

The No. 165 hydraulic control is intended primarily for control of the bulldozer blade. However, its use can be expanded so that it will also control either a tilt cylinder or a tractor-mounted ripper. This is possible by the addition of one internal valve. The addition of another, externally mounted valve makes it possible to control a bulldozer blade, tilt cylinder and ripper with the one hydraullic unit.

The No. 143 hydraulic control can

(Continued on Page 26)

how Highway helps you...

Lima 1250 at River Hill Coal Co., Kylertown, Pa.

...boost production!
...cut costs!

- Helps you select exactly the right equipment for your job!
- Helps you by delivering new, rental or used units promptly.
- Helps with economical, convenient financing.
- Helps with 'round-the-clock, expert, friendly service.

A-1680A

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Allis-Chalmers • Master • Lima • Thor • Heltzel • Gar Wood
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(Continued from Page 24)

be used for operation of the tilt cylinder on cable controlled bulldozer blades, or for control of the tool bar and the tool bar bulldozer. The tilt cylinder is foot controlled, increasing the ease of operation and encouraging higher production.

Hydraulic control cylinders are center-mounted, allowing almost twice the bulldozer blade drop below ground level. The standard radiator guard has been strengthened through re-designing and now permits installation of hydraulic or cable bulldozer blades without requiring a special, heavy duty guard. Increased efficiency is the keynote of the new operator's compartment. Gear shift selector lever and forward-reverse lever are relocated so as to reduce hand travel distance. Also, the seat has been moved six inches forward and is fitted with wide arm rests and side padding. Footrests are relocated, providing more natural work positions. Gauges are grouped into a new, console-type panel, making them more easily read and protecting them from damage.

Increased lugging ability of the new D6 Series B Tractor makes the 93 horsepower machine a high production unit even in wet underfoot conditions. The prototype model shown here is fitted with an air cleaner extension.

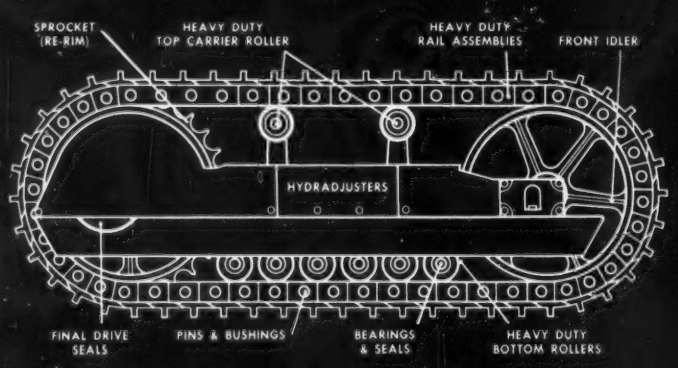
An all-new gasoline starting engine with off-track recoil starter is standard on the D6 Series B Tractor. This new engine develops 15 horsepower. In-seat starting for the gasoline engines is optional and makes use of a 12-volt electric system. Also available as optional equipment is a 24-volt direct electric starting system for the diesel engine. Batteries for both the 12-volt and the 24-volt in-seat starting systems are located beneath the operators arm rest.

Both the diesel and the gasoline starting engines are equipped with the new, high efficiency dry type air cleaners. The dry type air cleaner on the diesel engine is of a new type, consisting of two filter elements. The main element is easily removable and quickly cleaned with air pressure. A second, safety element provides additional protection to the engine in the event the main filter element receives undetected damage. A top-mounted precleaner removes the majority of all filterable foreign particles with the primary element taking out the remainder. The new air cleaner has a minimum efficiency of 99.8 per cent under all conditions.

Operator visibility is improved to the point where the cutting edge of both right and left ends of the dozer blade are visible. The increased visi-

(Continued on Page 29)

QUALITY REPLACEMENT PARTS IN STOCK FOR "CAT," "AC," "IHC"



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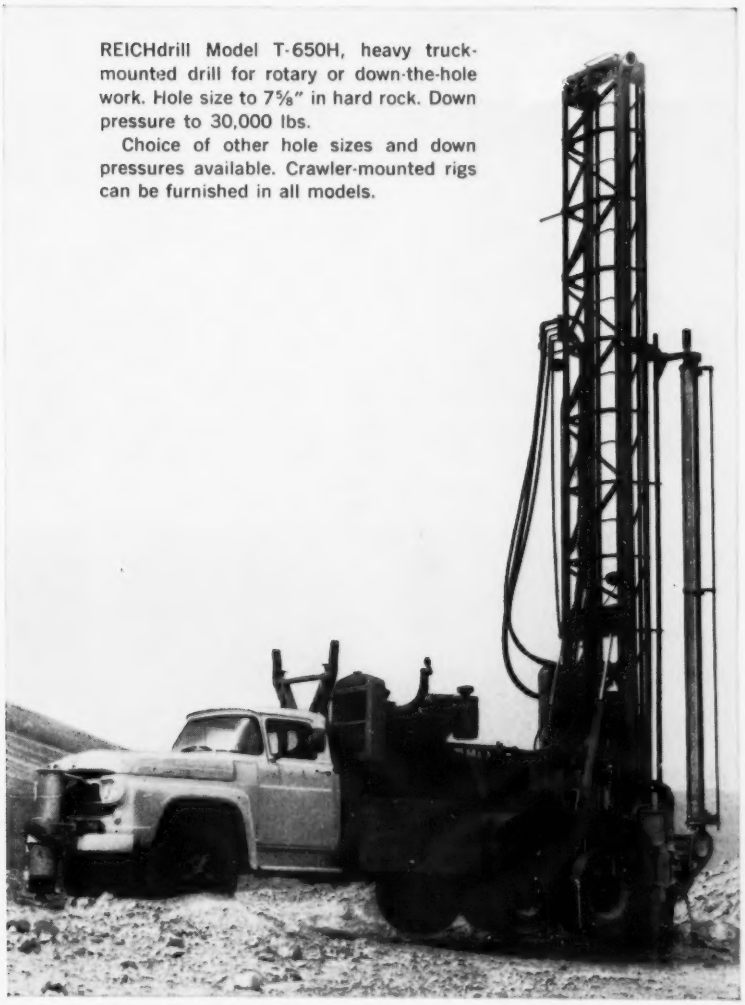
WHEN YOU RUN A **REICHDRILL** YOU'VE GOT A RIG THAT IS **ALL-HYDRAULIC** AND FEATURES **TOP-DRIVE**

Drillers get "more hole per hour with a REICHdrill" because . .



REICHdrill Model T-650H, heavy truck-mounted drill for rotary or down-the-hole work. Hole size to 7⅝" in hard rock. Down pressure to 30,000 lbs.

Choice of other hole sizes and down pressures available. Crawler-mounted rigs can be furnished in all models.

ALL-HYDRAULIC TOP-DRIVE MEANS:

1. **Infinitely variable speed** of drill rotation from zero rpm to maximum rated speed of model—permits the right rotational speed for every formation.

2. **Safety torque release** which practically eliminates all chance of drill breakage . . . protects all drive components.

3. **Direct-drive to drill stem** eliminating power loss . . . no complicated transmission to wear or maintain . . . no rotary table.

4. **In and out of the hole faster** because no kelly bar is required.

5. **Operator can drill up as well as down** should bit become stuck.

And the REICHdrill offers these outstanding advantages: Dependable heavy duty CP Compressors supply plenty of air to suit demand . . . Fast-acting, ram-type hydraulic levelling jacks . . . CP "Air-Blast" Bits give you extra footage in the toughest formations . . . Angle drilling—operator simply sets correct angle and drills.

Prove it on YOUR OWN WORK. We're GLAD to demonstrate! If the Reich doesn't **out-drill any other rig you may have** — pound for pound of weight, and dollar for dollar of investment, we won't expect you to be interested. Write, wire or phone —

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Find out the Extra Profit you'll make with a REICHdrill

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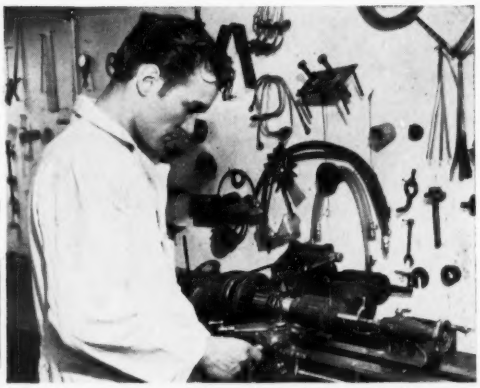
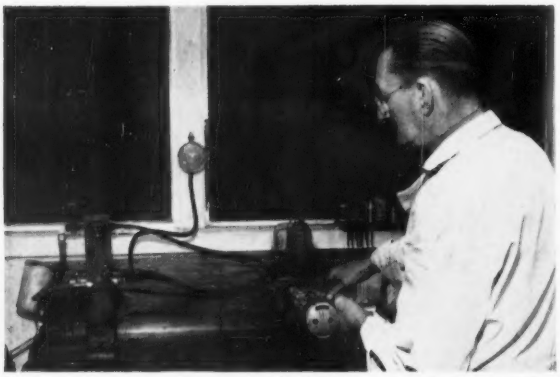
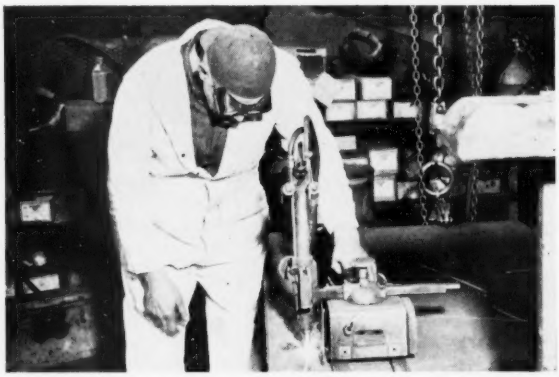
UNion 4-4057 . . . . Erie



Sam Sarver "turns down" and "rounds" armature in Highway's Pittsburgh shop.



Veteran engine expert Jack Sable tests fuel transfer pump.



Henry Puhl operates automatic line cutter which accurately shears steel of all thicknesses.

Charles Hovanec puts main bearing insert in Allis-Chalmers engine.

Miss Betty Ritzel requisitions parts from manufacturers via direct TWX wire.

Highway offers 'round-the-clock service on all repair and maintenance jobs—large or small. There are 87 expert, factory trained mechanics to serve you . . . parts stocks of more than 23,800 different items . . . direct TWX lines to manufacturers . . . 32 traveling service trucks . . . the finest over-all service ever offered by any distributor.

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(Continued from Page 26)

bility is partly attributable to the new, tapered hood as well as to relocation of the new seat.

The D6 Series B Tractor has sufficient fuel capacity for a complete work shift. Fuel tank capacity was increased to 65 gallons from 48 gallons on previous models.

Balance and stability of the machine, and its ability to be worked with heavy, front mounted equipment is improved through use of the new, compact engine. Oscillation is increased through a new equalizer spring arrangement that "shifts" the center of gravity uphill when operating on sideslopes. This increases the already great versatility of the machine by making it capable of safely working on steep sideslopes.

The No. 6S and No. 6A Bulldozer and the No. 6 Tool Bar are available with the new D6 Series B Tractor. The No. 6S blade for the 60-inch gauge tractor has been modified to a total width of eight feet, meeting transport requirements. The tilt cylinder on the new D6 is foot controlled.

A fixed drawbar with cast steel brackets and a two position clevis is standard. A swinging drawbar is available as optional equipment.

A large diameter idler is standard on the new D6, with a small idler available as an attachment. Six track rollers are mounted on each frame. All track rollers and the idler as well as the carrier rollers are Lifetime Lubricated. A hydraulic track adjuster is available as an attachment.

Power is transmitted from the engine to the transmission and final drive gears through the Caterpillar oil clutch.

Bevel gear and pinion of the new D6 are improved and have increased capacity because of a coarser pitch.

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Regular service hours are 8 a. m. to 3 a. m. But, for emergency work, Highway is open 'round-the-clock.

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Drills holes faster — Will not snap off shank or chip points — Outlasts four or five ordinary augers.

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We have often published this statement: "J. T. FISH is always ready to Buy or Sell."

We are able to live up to this pledge because we operate a diversified, large volume business on a small margin of profit.

Just as we guarantee an unfailing source of supply to our customers, we guarantee a year-round market for complete Mine, Rails, Wire and Equipment of any kind — at fair prices regardless of seasonal fluctuations.

We Own What We Advertise

JOY EQUIPMENT—REBUILT

3—Joy 14BU Loaders, low pedestal, 7AE, '56 & '57.
6—Joy 14BU Loaders, medium pedestal, 7RBE.
1—Joy 14BU & 7CE high pedestal loader.
4—Joy 14BU 3PE Loaders
2—12BU10E Joy Loaders complete with Piggybacks.
2—Joy 12BU Loaders, 9E, latest type.
1—Joy 20BU Loader, latest type.
4—Joy 11BU Loaders, latest type.
1—Joy 8BU Loader, 34" overall height.
2—Joy 8BU Loaders, 220 volt AC.
1—Joy curved Bar Head, complete.
6—Reliance 24-J Motors, 7½ H.P.
4—Reliance 38-J Motors, 10 H.P.
20—9-J Motors, 4 H.P.
2—Goodman 660 Loaders on Crawlers 440 volt DC, like new.
1—Goodman 660 Loader on Crawlers, excellent 250 V. DC.
1—Goodman 665 Loader on Crawlers, latest type 250 V. DC.
1—Goodman 865 Loader 26" hi. Rebuilt. 250 V. DC.
4—Joy 8SC Shuttle Cars, Rebuilt.
4—Joy 6SC Shuttle Cars, rebuilt, latest type.
1—Joy 5SC Shuttle Car, Excellent
2—Joy 32E9 Shuttle Cars.
2—Joy 32E10 Shuttle Cars, rebuilt.
2—Joy 32E15 Shuttle Cars, rebuilt.
4—Joy 32E16 Shuttle Cars, rebuilt.
2—Joy 42E16 Shuttle Cars, Rebuilt.
10—Joy 42E16 Shuttle Cars, rebuilt.
2—Joy CD-22 Drills, on rubber, like new.
6—Joy T-2-5 low pan Crawler Trucks, rebuilt.
1—Joy T-2-6 low pan Crawler Truck with reel.
2—Joy T-1 Standard Crawler Trucks, 220 AC.
1—Joy T-1 Standard Crawler Truck, 250 DC.
2—Goodman low pan Crawler Trucks, like new latest type.
4—Joy 11-B Cutting Machines, like new, 35 and 50 H.P.
1—Joy 7-B Cutting Machine, like new, 250 volt DC.
2—Goodman 212 Cutting Machines, 19" high.
4—Goodman 312 Cutting Machines, 17" high.
3—Goodman 412 Cutting Machines, 19" high.
1—Goodman Machine on Crawler, 31" high. All hydraulic.
6—Goodman 512 Machines with Bugdusters.
6—Goodman 612 cutting machines, 250 and 500 volt.
1—Lee Norse low vein Machine Carrier on rubber.
1—Jeffrey 70 URB rubber tired Cutter. Universal head, perfect condition.
1—Goodman 2410 rubber tired Cutter, Universal Head, like new.
3—Joy 11RU Rubber Tired Cutters with bugdusters, Universal heads, dual tires, like new, 250 V. DC.
2—Joy 10RU rubber tired cutters Universal head, 220/440 volt AC, perfect.
4—Joy 10RU rubber tired Cutters, Universal Head, 250 V. DC.
6—7AU's on track, Universal head.
2—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on Crawlers, 250 volt DC.
1—Jeffrey 29LC on Crawlers, rebuilt.

LOCOMOTIVES

1—Goodman 6 ton, 93-A, 27" high, armor plate frame.
1—Jeffrey 15 ton MH-77 Locomotive, Armor Plate frame.
3—Jeffrey, 13 ton, type MH-110, 36", 42", 44" ga.
2—Jeffrey, 10 ton, type MH-110, 42" and 44" Ga.
2—Jeffrey 10 ton type MH-78, 42" & 44" Ga.
2—Goodman 8-30 and 10-30 Locomotives, 26" above rail.
1—Jeffrey MH-124, 6 ton, 24" overall height.
12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
4—Jeffrey, 8 ton, type MH-100, 2½" armor plate frames.
1—Jeffrey, 6 ton, type 2186, 22" above rail.
3—Jeffrey, 4 ton, type MH-96, 42", 44" and 48" Ga.
1—G. E., 4 ton, type 825 Locomotive, 22" high.
10—G.E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
1—G.E. 8 ton, type 822 Locomotive, 44" Ga.
3—G.E. 10 ton, type 809 Locomotives, 42", 44" 48" Ga.
2—Goodman, type 33, 6 ton, 44" and 48" Ga.
3—Westinghouse, type 902, 4 ton, 42" and 48" Ga.
2—Atlas Battery Locomotives, 36" Ga.
1—Atlas Trolley Locomotive, 4 ton, 24" high.
2—Westinghouse, type 904, 6 ton, 44" and 48" Ga.
2—Westinghouse, type 907, 10 ton, 44" and 48" Ga.
2—Westinghouse, type 906, 44" and 48" Ga.
8—Jeffrey MH-78 Locomotive Units, cheap.
4—Jeffrey MH-88 Locomotive Units, real bargains.
6—Jeffrey MH-100 Locomotive Units, reasonable.
3—Plymouth Diesel Locomotives, 8 and 10 tons, 42" and 44" Ga.
Locomotive Trucks and Spare Armatures for all the above.

TIPPLE EQUIPMENT

All steel 5 track Tipple, new 1957, complete with washer, silo, oil treating system, all bolted construction.
1—Complete Five Track Tipple with Washers and Air Tables.
2—Complete Tipples, 3 and 5 track, steel and wood.
3—Cleaning Plants, 1 Ea. McNally, Roberts and Schaefer, Jeffrey, Washers and Airflo Tables.
4—Complete Aerial Trams for coal or refuse.
3—Complete Rope and Button Lines.
2—Monitor Lines complete with Drums, excellent.
1—Allis-Chalmers 5' x 12' Rippflo Vibrator
1—Allis-Chalmers 4' x 12' Low-Head Vibrator
1—Robins Gyrex Vibrator 4x10.
10—Belt and Apron type Loading Booms.
6—Shaker Screens
1—Robins Car Shakeout.
20—Crushers, various sizes—Jeffrey McClanahan & McNally.
4—Mine Scales, 10 & 20 tons.
5—Truck Scales, 25 to 40 tons, late type.
Feeders, Belt and Drag Conveyors, Car Retarders, etc.

CUTTING MACHINES

2—Joy 10RU rubber tired cutters, Universal head, 220/440 volt A.C. Perfect.
4—Joy 10RU rubber tired Cutters, Universal Head, 250 V. DC.
3—Joy 11RU, rubber tired Cutters, 250 V. DC.
1—Goodman 2410 rubber tired Cutter Universal, Head, new, 1956, Excellent.
2—Jeffrey 29UC Universal Machines on Crawlers.
1—Goodman on Crawlers, 31" overall height.
3—Baby Goodman 212's, rebuilt, 250 Volt DC.
2—Goodman 212 Cutting Machines, 19" high.
4—Goodman 312 Cutting Machines, 17" high.
3—Goodman 412 Cutting Machines, 19" high.
6—Goodman 512's with Bugdusters, like new.
4—Goodman 512's, rebuilt, or as removed from service.
6—Goodman 612's—250 & 500 V.
3—Goodman 112's 220/440 volt AC.
1—Joy 7-B Cutting Machine, 250 volt DC.
4—Joy 11B Cutting Machines, rebuilt. 35 and 50 H. P.
6—7 AU's, on track, Universal head.
10—Goodman 12AA's and 112AA's, 250 volt DC.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
2—Goodman, 824 Slabbers.
6—Jeffrey 35L's, like new, 17" high.
2—Jeffrey 35L's on low vein trucks.
15—Jeffrey 35B's and 35BB's.
2—Jeffrey 29B's on track.
10—Jeffrey 29C's, track mounted.
2—Jeffrey 29L's on Crawlers. Excellent.
3—Sullivan CE7. 220 volt AC.

CONVEYORS

1—Robins 36" tandem drive, with or without structure.
1—Jeffrey 52-B tandem drive 30" Belt Conveyor, 1000'.
1—Joy 30" Underground Belt Conveyor. Excellent.
1—Goodman 97-C, 30" tandem drive.
1—Goodman 97-C, 26" Conveyor, 1,000' long.
1200' Robins 36" Underground Structure like new.
1,000'—Conveyor Belt 42".
4,000'—Conveyor Belt 36".
4,000'—Conveyor Belt, 26".
8—Jeffrey 61AM 12" Chain Conveyors, 300'.
2—61EW Elevating Conveyors.
2—61WH 15" Room Conveyors, 300'.
2—Joy 15" Room Conveyors, 300'.
2—Joy 20" Conveyors, 300'.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.
1,000' Goodman 18" Flat Belt Conveyors, tandem drive, any length. Perfect.

CONVERTERS AND DIESEL PLANTS

1—300KW Portable Rectifier, 3 car unit, excellent.
2—500KW G. E. Stationary Rectifiers
4—1,000KW Stationary Rectifiers.
2—100KW, G.E. TCC-6's, 275 volt, Rotary Converters
1—150KW, G. E. HCC-6, 275 v., Rotary Conv.
1—150KW, 6 phase, Allis Chalmers Rotary Converter, 275 V. DC.
2—200KW G.E. HCC-6's, Rotary Converters, 275 V. DC. Steel Frames, Newly rewound.
3—300KW, G. E. HCC-6's Rotary Converters, 275 V. DC, like new
2—300KW Westinghouse, 6 phase, Rotary Converters, 275 volt DC.
2—500KW Westinghouse Rotary Converters, 275 volt DC.
2—200KW Westinghouse Rotary Converters, 275 V. DC. Newly rewound. (all the above with 6900/13000 and/or 2300/4000 primary transformers)
2—100 KW MG Sets, 275 volt DC.
2—150KW MG Sets, General Electric and Westinghouse, 275 V. DC.
1—200KW MG Set, Westinghouse, rebuilt, 275 V. DC.
1—200KW MG Set, General Electric, perfect. 275 volt DC.
2—300KW G. E. MG Sets, like new.
1—300 KW Westinghouse, 600 volt MG Set, rebuilt.
2—300KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
2—500KW Westinghouse, 600 volt, DC, 6 phase, Rotary Converters.
2—300KW HCC-6's Rotary Converters, 6 phase, 600 volt DC.
1—GMC 471 Diesel with 60 KW, 250 volt DC Generator.
2—GMC-671 Diesels with 75 KW, 250 volt DC Generators.
1—Cummins 125 KW, Diesel with 250 volt DC Generator.
1—Allis Chalmers Natural Gas Engine with 100 KW Generator, 275 volt DC.
Boilers, like new, 500 H.P.

LOADING MACHINES

16—Joy Loaders, 14BU, 12BU, 8BU, 11BU, 20BU.
3—Joy 12BU9E Loaders, latest type.
2—Joy 12BU with Piggyback Conveyors.
2—Goodman 865 Loaders, 26" on Crawlers.
1—Goodman 665 Loader on Crawlers.
2—Goodman 660 Loaders, 440 volt AC perfect.
1—Goodman 660 Loader, on Crawlers, 250 V. DC.
1—Goodman 460, on track, Rebuilt, All Hydraulic.
2—Jeffrey 61 CLR's, on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Myers Whaley, No. 3 Automatic Loaders.
2—Clarkson Loaders, 26" above rail.

MISCELLANEOUS

1—Complete Five Track Tipple with Washers and Air-Tables.
5—Complete Tipples, 3 to 5 Track, Wood and Steel.
Steel Trestles for drop bottom cars.
All Steel Armco Buildings.
20—Jeffrey Molveyors on rubber tires.
1—¾ Yard Shovel and Back-Hoe.
1—¾ Yard Crawler Crane.
Battery Supply Tractors, rubber tired.
1—Cantrell Air Compressor on rubber tires.
10—Air Compressors, 1 H.P. to 40 H.P.
2—Joy self propelled rubber tired compressors, 240 cu. ft.
2—Acme self propelled rubber tired compressors, 130 cu. ft.
40 Mine Pumps, all types.
1—Differential 40 Passenger Man-Trip Car.
6—MSA Rock Dusters.
2—Phillips, Carriers, 44" and 48" Ga.
1—Barber Greene self propelled Bucket Elevator.
Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
300 Mine Cars, drop bottom, 42" Ga.
90 Mine Cars, drop bottom, 44" ga.
50 Mine Cars, drop bottom, 48" Ga.
100 Mine Cars, 18" high, end dump, 44" Ga.
300 Mine Cars, end dump and drop bottom, 20" high, 48" Ga.
1—10 ton Mine Car Scale with Recorder.
15—Brown Fayro HKL and HG Car Spotters.
1—Brown Fayro Hydraulic Car Spotter.
1—12 ton Differential Slate Larry.
Incline Hoists, 25 to 50 H.P.
1—Jeffrey 5' Aerodyne Fan, like new.
1—Jeffrey 6' Aerodyne Fan.
2—Storage Tanks, 4,000 Gallons.
2—Storage Tanks, 10,000 Gallons.
10,000 Five Gallon G. I. Cans, screw lids.
2,500 tons Relaying Rail, 25 lb., 30lb., 40lb., 50lb., 60lb., 70lb.
30—tons Copper—4/0 and 9 Section Trolley 1/0, 2/0, 4/0 Stranded.
Thousands of feet of rubber covered three conductor cable. All sizes.
300 Transformers from 1 to 300 KVA, 110 to 13,000 primary volts.
400 Electric Motors, 3 to 250 H. P.
Huge stock of Mine Supplies.
600 MSA Mine Lamps, Chargers, etc.
4—Mine Scales, 10 & 20 ton.
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Mack & International tandem dump trucks.
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Seven Marions—two in service since 1948 and five since 1954—have been giving their owners top payload performance with minimum downtime.

Each unit hauls about 280 tons per day in 35 trips from the quarry to the crusher. The bodies are RB-50s, 5 cubic yards, with sideboards. The double arm underbody hoists are HD-8s.

Other Marion equipment in use at this ultra-modern quarry includes 5 trailer dumps, 5 tandem axle and 5 single axle units. The owners also use Marion equipment exclusively at their other two operations—a quarry and a coal mine.

If you want more information about how rugged Marion rock bodies and heavy duty hoists can help your quarry operation, write direct or see your Marion Distributor.

MARION METAL PRODUCTS CO.
Marion, Ohio, U.S.A.

ADVERTISER'S INDEX

MAY, 1960

Austin Powder Company	4th Cover
Beckwith Machinery Company	2, 3, 15 to 18, 3rd Cover
Cowin Equipment Co., Inc.	6, 7
Davey Compressor Co.	1
Fish, J. T.	30
Highway Equipment Company	1st Cover, 5, 8, 25, 28, 29
Manitowoc Sales and Service Corp.	31
Marion Metal Products Co.	31
Maximon Machine Company, Inc.	26
Mine Safety Appliances Co.	11
Nixon Machinery & Supply Co.	6, 7
Northeastern Incorporated	29
Ohio Machinery Co.	15 to 18
Old Ben Coal Corporation	10
Paulick, P. R.	31
Rish Equipment Co.	6, 7
Salem Tool Company, The	6, 7, 30
Scottdale Machine, Foundry & Construction Co.	10
State Equipment Co.	12
Swabb Equipment Co., Frank	27, 29, 31
Walker Machinery Co.	15 to 18
Whitmyre Equipment Co.	6, 7
Wilson Machinery & Supply Co.	6, 7

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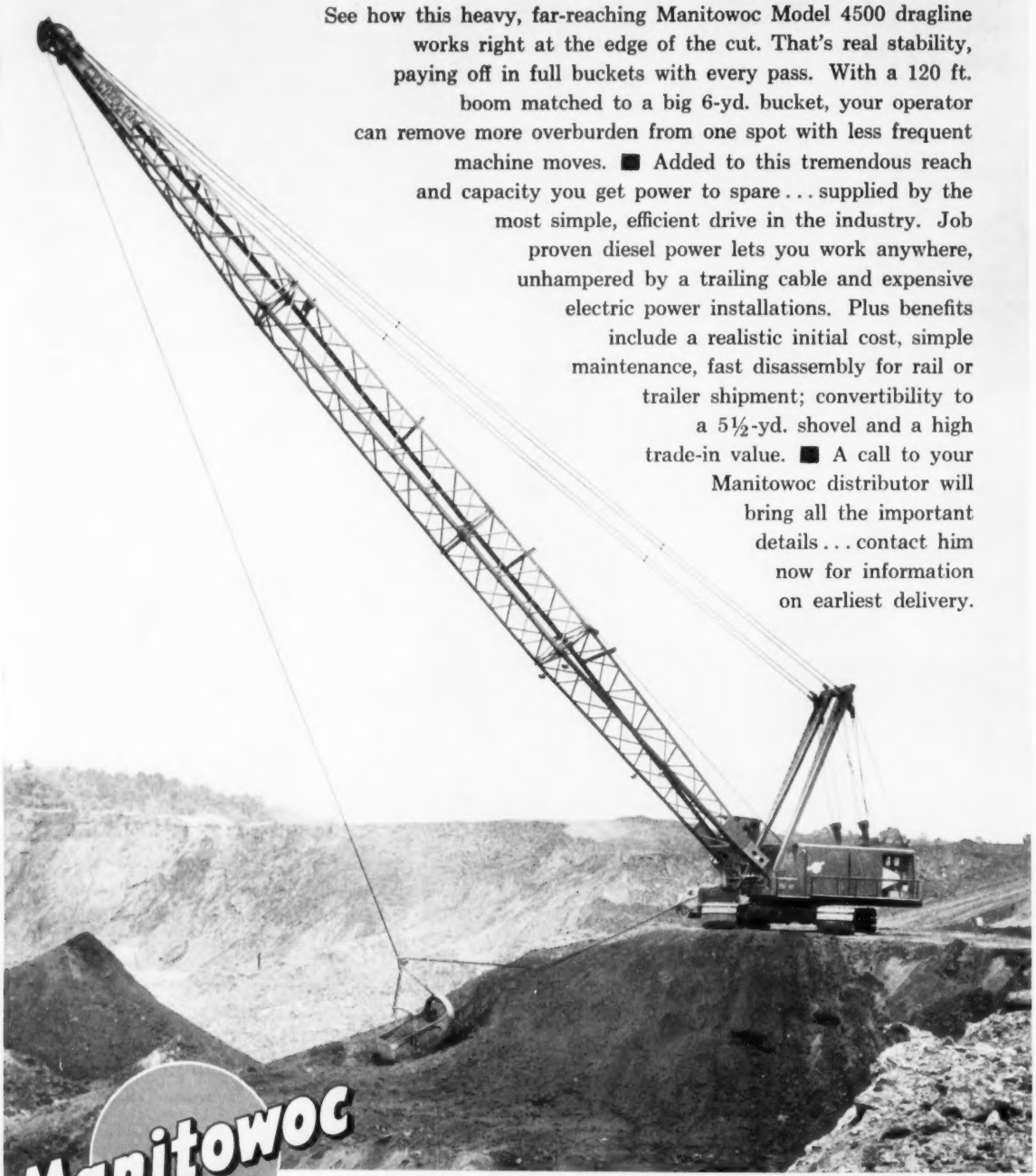

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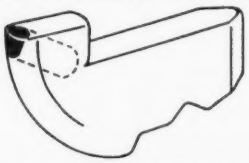
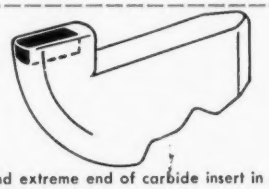
AP-20D



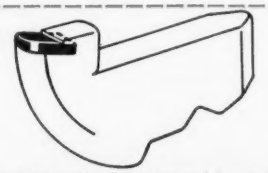
Entire surface of carbide insert with exception of cutting edge is brazed to shank.

AP-20



Three sides and extreme end of carbide insert in end mill type bit are brazed to shank.

AP-20R



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